

RE-210

Service Manual



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CONTENS

Chapter 1 INTRODUCTION

1.1 Feature

1.2 Brief Description about Hardware

1.2.1 General

1.2.2 Engine

1.2.3 Audio

1.2.4 Power Module

Chapter 2 DIAGNOSTICS

2.1 About Diagnostic

2.2 Entering Scanner Diagnostic

2.2.1 LED and Button Test

2.2.2 Knob Test

2.2.3 Keyboard Test

2.2.4 Pedal Test

2.3 Engine Test

2.3.1 Entering Diagnostic

2.3.2 How To Test

Chapter 3 TROUBLESHOOTING

3.1 Introduction

3.2 Front Panel Problems

3.2.1 Panel does not light at all

3.2.2 Some sections of front panel now working

3.2.3 Erratic Front panel Activity, Lights Dimming

3.3 Power Problem

3.3.1 No Power

3.3.2 Blown Fuses

3.3.3 Power Switch and Fuse OK, No Power

3.4 Audio Problem

3.4.1 No Audio Distortion

3.4.2 Distortion

3.4.3 Lights on, No Audio

3.4.4 Mal functioning Treble or Bass Section

* Interconnection Diagram

Chapter 4 – PART LIST

4.1 PCB & Sub Assemblies

4.1.1 ASSY PHONE AND POWER

4.1.2 ASSY CONTROL PANEL LEFT

4.1.3 ASSY CONTROL PANEL RIGHT

4.1.4 ASSY SOUND ENGINE

4.1.5 ASSY CABLE

4.1.6 SPEAKERS

CHAPTER 5 – SCHEMATICS

5.1 Block diagram

5.2 Front Panel

5.3 Amplifier

5.4 Sound CPU

5.5 Sound Engine

5.6 Scanner

Chapter 1

INTRODUCTION

1.1 Feature

- 88 notes, Graded-Hammer type keys
- Three Pedals
- 7 different types of keyboard touch sensitivity
- 37 Preset Sounds (Including Triple-Strike Stereo Piano Sample)
- Real-time Sound Expression
- Sound Layering with Volume Balance.
- Left Key Split
- Transpose, Detune
- 3Reverb and 3 Effects (Chorus1, 2 and Flanger)
- 60-Watt Sound System with Bass and Treble control
- 3 * 7-Segments Display
- 2 songs, 2 tracks Recorder
- Metronome
- Tap tempo
- 50 Piano Demo Songs
- 20 Preset Demo Songs
- Line In / Out
- MIDI In / Out
- 2 Headphone Jacks

1.2 Brief Description of Hardware

1.2.1. General

Mainly, RE-210 is based on KME-61 engine(1 MABEL system, 32poly) and digital amplifier by APOGEE DDX-Series – DDX-8000(controller) and DDX-2060(power stage) Power module is made up of SMPS 30V/1.5A from C&C Tech, and a series of DC to DC converter. L4971(from ST) – get VCC(+5V), LD1086DT33(from ST) +3.3V, LD1086 DT25(from ST) – get +2.5V. Scanner is also composed of MEGA128(ATMEL) this same as KME-61

1.2.2. Engine

Basically, RE-210 Sound Engine is based on KME-61. 1 MABLE system(32 poly)

1.2.3. Audio System

Digital Amplifier system from APOGEE, DDX-8000(controller chip) shows great Performances & sound. Mainly this chip designed for DVD-receiver and other consumer product.

A short features are below

1. 8-channel, 24-bit digital processing
2. I2C control bus
3. Support 32-192Khz sampling rate
4. Base and Treble control
5. User programmable 28-bit parametric filters
6. Selectable high-pass filter
7. Variable digital limiter functions

Details are in spec sheet, visit following pages

http://www.apogeeddx.com/apogee_products.html#DDX8000

DDX-2060 are power stage amplifier, features are

1. 2 X 35W, 6 ohm
2. Use single power supply(8 to 28V)
3. Digital volume control

Details are in spec sheet, visit following pages

http://www.apogeeddx.com/apogee_products.html#DDX2060

1.2.4. Power Module

Main power is from SMPS(30V, 1.5A), for activating controller (DDX-8000), we use additional two voltage needed -> +3.3V, +2.5V, +38V(these for DDX-2060) including VCC(+5V) which delivered from L4971(ST DC-DC Converter). Using L4971 user can select output voltage from 3.3 to 24V DC, 3.3 and 2.5V is regulated from L4971 output(in RE-210 output voltage of L4971 is configured +5V). LD1086DT25 and 33 is low drop regulator IC for +2.5V and +3.3V each.(actually At first we used conventional 7885 but it has a little drop as input voltage, so we changed it to LD1086 Series), **DON'T FORGET POWER MODULE(SMPS) ARE FREE VOLTAGE!!**

Chapter 2

DIAGNOSTICS

2.1 About Diagnostic Mode

In Diagnostic mode you can check integrity of RE-210. Mainly, there are two distinct diagnostic mode, one is Scanner Diagnostic and the other is Engine Diagnostic. First, Scanner diagnostic allow you to check various physical section such as KEYBOARD, BUTTON and LEDs, PEDAL, and KNOB. Second Engine Diagnostic you can see the state of the sound engine, for example, Sound ROM, D-RAM and so on...

2.2 Entering Scanner Diagnostic

How To enter scanner diagnostic mode

1. Turn the power up
2. After power up normally press "DEMO" and "MIDI/Pref" button simultaneously
3. After step 2, segment displays "DIG" and system entering scanner diagnostic mode
5. OK, now your in scanner diagnostic mode

2.2.1 LED and Button Test

During led test you can investigate current state of the LED. Pressing any button turns corresponding LEDs are on (where corresponding means LEDs are connected to button Such as press "REVERB" button turns all REVERB LEDs are on, and "EFFECTS" too.) Don't forget. "UP" and "DOWN" button do not have led connected, so push "UP" or "DOWN" button alone does not turn any led on. You can turn all LEDs on at one time, press "UP" and "DOWN" button simultaneously. Turns all LEDs on, It might be flicker, but it's OK.

2.2.2 Knob Test

This test you can check integrity of the 3 knobs. RE-210 has 3 knobs, "VOLUME", "TREBLE" and "BASS". Turn left or right any knob displays current value of the knob you touched. Each has a little bit different ranges. Ranges are below. Be sure that "DOT" displayed during the KNOB test means the Knob – connected to DOT – is activate now. Don't forget error range is +/- 1 or 2. The range of each Knob and corresponding Dots are

described below.

VOLUME Knob is 0 to 255 range(+/- 1 or 2 error will be ok) and Leftmost Dot on,
BASS and TREBLE Knob is 0 to 25 range and
BASS makes centered Dot turns on and TREBLE makes Right most dots on
(and also has same error tolerance as VOLUME)

2.2.3 Keyboard Test

This test you can check each key of the keyboard. If any key press segment displays corresponding Key name Key Number such as press C4, segment displays "C 4"

Each key has two key switches. Press softly(about 1/4 of the whole pressure) makes first switch on and leftmost dot turns on, and press a key firmly make rightmost dot turns on

2.2.4 Pedal Test

During this test you can check the correctness of the built-in 3-Pedals. All pedal displays a same value during this test. If pressed segment displays "127", if not segment displays "0". As knob test did, dot displays current position of the each pedal. Such as press leftmost pedal, turns leftmost dot on and so on.

2.3 Engine Diagnostic

2.3.1 Entering Diagnostic

Following buttons used in Diagnostic

- Entering Diagnostics : Press "MIDI/Pref" when power on
- Changing Menu item : "UP" and "DOWN" button
- Select and Cancel : "Electric Bass" – Cancel, "Custom" – Enter

How To Enter Diagnostic

- 1 Power up the device
2. All LEDs in front panel, flashed one time. If not check connection cable between Engine Board and Front Board.
3. Press "MIDI/Pref" button and system will be entering boot block mode.
After system entering boot block, 7-Segment displays "uOS"(mean update Operating System)
4. Then press "UP" button twice, and then Segment displays "DIG" now system

ready to entering diagnostic routine

5. After step 4, Press enter button, and enter Diagnostic mode

One for the first time in diagnostic mode, system displays “One” press “UP” and “DOWN” button can access both “ONE” and “BURN-IN”

In one test, ease test item tested separately, in BURN all items continuously

In burn-in mode Rattle Test will be skipped.

In burn-in mode sine wave test lasts only 2 seconds

If error occurred in any test(one or burn-in, “Record” button will turn on as RED

Menu test	burn-In test
‘ROM’ – ROM Test	‘ROM’ – ROM Test
‘RAM’ – RAM Test	‘RAM’ – RAM Test
‘MBL’ – MABEL Test	‘MBL’ – MABEL Test
‘SRM’ – Sound ROM (SROM) Test	‘SRM’ – Sound ROM (SROM) Test
‘DRM’ – Delay RAM Test	‘DRM’ – Delay RAM Test
‘MID’ – MIDI Test	‘MID’ – MIDI Test
‘SIN’ – Sine Test	‘SIN’ – Sine Test
‘RTL’ – Rattle Test	

2.3.2 How to Test

After see ‘One’ in front panel. Press enter button (custom) and entering each test. you can access each test item with “UP and “DOWN” button After selecting each test item press enter, such as Select ‘ROM’ Test press Custom(Enter) button and result will be displayed for &=Segment.

Chapter 3

Troubleshooting

3.1 Introduction

Execute “Hard Reset” first, if you find any problem. After boot-up normally, press “MIDI/Pref” button, and then press “Percussion” button And panel displays “Y ?” press “UP” or “DOWN” button you like. “UP” button resets all system. **Be careful, all song recorded will be deleted during hard reset.**

ONCE AGAIN!!

1. Boot up normally
2. Press “MIDI/Pref” Button
3. Press “Percussion” button displays “rST” in Front panel.
4. After push “Percussion” button, panel displays “Y ?”
5. Press “UP” button execute a “Hard Reset”
6. That’s ALL

3.2 Front Panel Problems

3.2.1 Panel does not light at all

Check connection cable between front panel and engine

Check +5V supply on both Engine and Front panel

3.2.2 Some Sections of Front Panel not working

Check connection cable between front panel board (24 pin)

3.2.3 Erratic Front Panel Activity, Lights Dimming

Connection cable between engine and front panel would be smashed because

Of Shield cover. Check connection cables

3.3 Power Problem

3.3.1 No power

First check input ac voltage of power module.

3.3.2 Blown Fuses

Remove cover and change fuse

3.3.3 Power Switch and Fuses OK, No Power

Should carefully check power cable between Power Module and Engine Board (4pin)

3.4 Audio Problem

3.4.1 No Audio, Distortion

Check connection cable both woofer and tweeter, headphone

3.4.2 Distortion

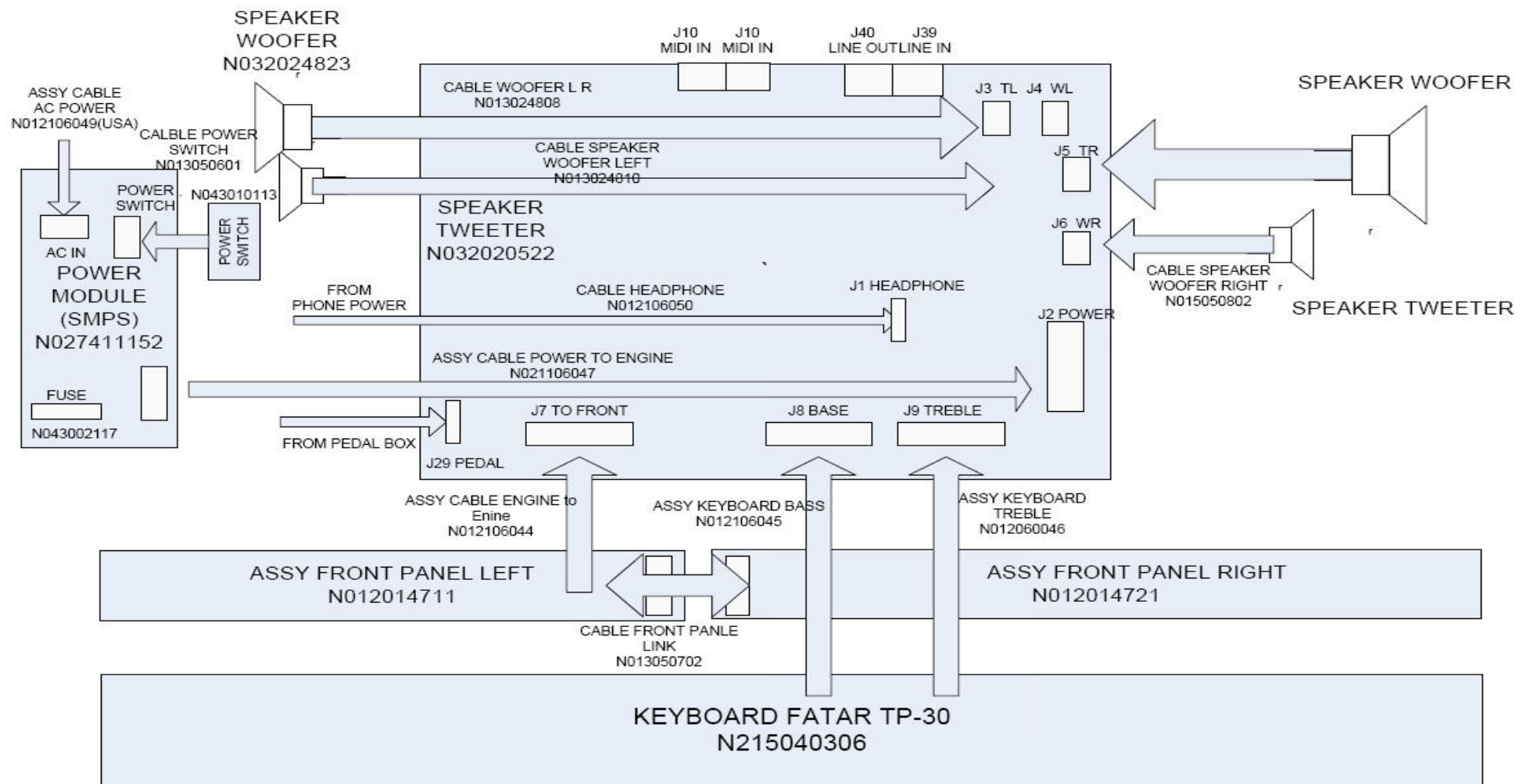
Audio out and in jack are bad, head phone jack too

3.4.3 Lights on, No Audio

If all cables ok, check, +2.5V, 3.3V, +30V power on the amplifier section of the engine board. For proper function, audio amplifier needs all 2.5V, 3.3V, +30V

3.4.4 Malfunctioning Treble or Bass Section

First check scanner diagnostic, if Knob Test OK, But still have a problem. Check I2C line at the scanner. (U5, PIN#25, 26)



Interconnection Diagram

Chapter 4

PART LIST

4.1 PCB & Sub Assemblies

Part No	Description	Q'ty
N012103771	ASSY PHONE & POWER	1
N012104711	ASSY CONTROL PANEL LEFT	1
N012104721	ASSY CONTROL PANEL RIGHT	1
N012300261	ASSY SOUND ENGINE	1

4.1.1 ASSY PHONE AND POWER

Part No	Description	Q'ty
N012103771	ASSY PHONE&POWER(usa/eur/dom)	1
N012106050	ASSY CABLE HEADPHON	1
N013050101	CABLE HEADPHONE 1000mm	1
N055002105	FERRITE core op 14.2x28.5-6.4hsn-06	1
N013050601	CABLE POWER SWITCH 1000mm	1
N025323308	MACHINE SCREW	1
N025874302	NUT M3 DIN934	1

Part No	Description	Q'ty
N027112100	STAR WASHER 3.3X6.5X0.5 WHITE	1
N032008807	BRACKET HEADPHONE JACK	1
N033101513	PCB PHONE	1
N041021007	HEADPHONE JACK	2
N041034005	HEADER .098"SP 5P (22-03-5055)	1
N042005018	GROUNDING WIRE	1
N043010113	POWER SWICH (KCD1-B3 Z10133BB, ZHONGXUN)	1
N052001204	CAP CERMONO Z5U EP/EG20/YDP2000N	2

4.1.2 ASSY CONTROL PANEL LEFT

Part No	Description	Q'ty	Location
N012104711	ASSY FRONT PANEL LEFT(DIP)	1	
N012104712	ASSY FRONT PANEL LEFT(SMD)	1	
N033118811	PCB FAB(Left Front Panel)	1	
N043010211	Tact Switch(160gf,Blue/Gray)	12	SW1~3,8~11,16~18,23,24
N045010901	LED SMD RED 1206	13	D1~3,8~10,15~17,22,24,28,32
N045010911	LED SMD RED/GREEN SPEARTION	1	D23
N041031230	HEADER 0.1SP DUAL ROW 24P	1	J3
N045020230	LED DISPLAY 3x7 snd 430 asg	1	DS1
N051101421	RES POT 10K LIN H20XL12.5XW9.8,6mmπ	3	R4~6

4.1.3 ASSY CONTROL PANEL RIGHT

Part No	Description	Q'ty	Location
N012104721	ASSY FRONT PANEL RIGHT(DIP)	1	
N012104722	ASSY FRONT PANEL RIGHT(SMD)	1	
N033118812	PCB FAB(Right Front Panel)	1	
N043010211	Tact Switch(160gf,Blue/Gray)	25	SW4~7,12~15,19~22,25~37
N045010901	LED SMD RED 1206	25	D4~7,11~14,18~21,25~27,29~31,33~39
N051064033	RES TF	8	R7~14
N051101703	RES CF	1	R3
N052007503	CAP CER X7R	3	C3~5
N054000802	TR SOT-23 MMBT2222L	8	Q11~18
N054002906	TR PNP SOT-23 MMBT2907L	10	Q1~10
N061000302	IC LOGIC SOP16	1	U1
N061013902	IC LOGIC SOP20	1	U2
N061014003	IC LOGIC SOP20	1	U3
N041031220	HEADER .1"SP DUAL ROW 20P	1	J1
N041031230	HEADER 0.1SP DUAL ROW 24P	1	J2
N051000901	RES 10K X 4 5PIN	1	R2
N051000906	RES 10KX9 10PIN	2	R1,15
N052002422	CAP ELECT	2	C1,2
N013050701	CABLE FRONT PANEL LINK 30mm	1	
N013050801	CABLE SPEAKER TWEETER LEFT 1200mm	1	

Part No	Description	Q'ty	Location
N013050802	CABLE SPEAKER TWEETER RIGHT 650mm	1	
N025324306	MACHINE SCREW	22	
N025874303	NUT M4	4	C/P + TWEETER
N027113160	FLAT WASHER 4.5X10X0.5AN	4	C/P + TWEETER
N027211160	SPLIT LOCK WASHER	4	C/P +TWEETER
N032020522	TWEETER SPEAKER	2	
N032026395	CONTROL PANEL1.0 t EGI	1	
N035020631	LED WINDOWS	1	
N035022633	Large Button With LED(Gray)	3	
N035022634	Large Button With LED(Black)	20	
N035022635	Large Button No LED(Black)	2	
N035022636	Large Button With LED(Red)	1	
N035022643	Small Button With LED(Gray)	2	
N035022644	Small Button With LED(Black)	7	
N035022645	Small Button No LED(Black)	2	
N035026821	LED Light Pipe	6	
N035035401	KNOB LEBEL	3	
S00EZ7898	velcro 55X64X0.35t	2	

4.1.4 ASSY SOUND ENGINE

Part No	Description	Q'ty	Location
N012300261	ASSY SOUND ENGINE(usa/eur/dom)	1	
N012100261	ASSY SOUND ENGINE(DIP)	1	
N012100262	ASSY SOUND ENGINE(SMD)	1	
N033100502	PCB ENGINE	1	
N034012141	LABEL SERIAL NUMBER	1	
N049000030	MCU	1	U5
N051064110	RES TF	3	R6,13,64
N051066034	RES TF	1	R1
N051085053	RES TF	1	R41
N051100010	RES NET QUAD ISO	9	RN1,2,8,9,13~17
N051100011	RES NET QUAD ISO	7	RN3~7,10,11
N051101706	RES CF	4	R53,55,58,60
N051101708	RES TF	4	R26,27,31,32
N051101714	RES TF	3	R29,30,56
N051101718	RES CF	1	R33
N051101724	RES CF	1	R63
N051101730	RES CF	6	R4,23,25,35,54
N051101738	RES CF	2	R36,61
N051101740	RES CF	1	R74
N051101745	RES CF	3	R21,39,75

Part No	Description	Q'ty	Location
N051101757	RES CF	6	R2,3,5,22,24,46
N051101760	RES CF	2	R72,73
N051101780	RES CF	6	R47~52
N051101790	RES CF	3	R57,59,62
N051101791	RES CF	1	R34
N051103074	RES MF	4	R12,17,37,40
N051120030	RES TF	1	R28
N051125149	RES MF	4	R43~45,67
N051125202	RES TF	2	R38,42
N051130341	RES TF	4	R10,11,15,16
N051130350	RES TF	2	R9,14
N052001520	CAP TANT	2	C35,44
N052005326	CAP CER	2	C30,47
N052007001	CAP CER	2	C133,134
N052007002	CAP CER	2	C61,62
N052007004	CAP CER NPO	20	C5,73,74,95~100,139,144~148,189,190~193
N052007033	CAP CER	4	C135~138
N052007401	CAP CER NPO	29	C63~70,75~94,101
N052007503	CAP CER X7R	63	C29,31,37,38,40~41,45,46,48,51,54,71,72, 102~130,132,140,141,143,149,159,160,166,168
N052007809	CAP CER NPO	2	C3,6

Part No	Description	Q'ty	Location
N052007823	CAP CER X7R	1	C4
N052007824	CAP CER Z5U	13	C2,8,10,13,19,22– 27,32,34,42,49,53,56,180,181,183–188
N052007847	CAP CER NPO	1	C152,161
N052080001	CAP CER NPO	2	C154,155,
N053000703	DIODE RECT GP SMT 1A S1A SMA 1206	1	D4
N053000712	DIODE SHTKY SIG 5NS LO–C SL	2	D5,6
N053000802	DIODE SWITCH SMT DL–35	1	D3
N053001011	DIODE TVS	1	D1
N054000102	TR SOT–23 KST3904	1	Q3
N055001504	IND FE BD SMT 300mA	16	L8~15,16~18,20,21,23,26,29
N055001505	IND FE BD 2.5–TURN SMT	3	L19,22,24
N055001509	IND FE BD SMT 200mA 600Ω	2	L1,2
N059010051	CRYSTAL 16.0000MHz +/- 50PPM	1	Y1
N059010060	CRYSTAL 20.0000MHZ +/-50PPM	1	Y3
N059010062	CRYSTAL 24.576MHZ +/-50PPM FND	1	Y2
N061000802	IC LOGIC FAIRCHILD(TI) SOT–23	2	U14,15
N061000910	IC DIG UNBUF INV TINY SOT23–5	3	U17,22,23
N061007144	IC LOGIC SOP14 150	1	U27
N061008011	IC LOW DROP VOLTAGE REG 3.3V D2PACK	1	U4
N061008021	IC LOW DROP VOLTAGE REG 2.5V D2PACK	1	U2

Part No	Description	Q'ty	Location
N061010302	IC LOGIC SOP14	1	U7
N062001301	IC MPU MOTOROLA	1	U12
N062004905	IC IF UART W/FIFO ' S PLCC44P	1	U24
N062005532	IC MEM FLSH ROM 1MX16 70nS	1	U10
N062005704	IC GAL PLCC20,SMT 16V8A-150J	1	U21
N062100410	IC MEM SRAM 256kX16 55nS LOW PWR	1	U11
N062100416	IC MEMORY DRAM 1MX16 70nS(max)	1	U20
N062200201	IC LEVEL TRANSLATOR SOT23-8	1	U25
N062200211	IC STEREO AUDIO DAC	1	U30
N063002302	IC OPT COUPLER SOP6-170	1	U8
N064002010	IC ANA VCC MONITOR 4.75V SOT23	1	U6
N083016001	IC MASKROM BASE HI 830160-01	1	U18
N083016101	IC MASKROM BASE LO 830161-01	1	U19
N261008031	IC DIGITAL PROCESSOR	1	U1
N261008041	IC POWER AMP 35X2W CHANNEL POWER	1	U3
N266000412	IC CUSTOM	1	U16
N035040201	BATTERY HOLLDER TOSHIBA	1	J19
N041010302	JUMPER .1"SP 2POS	2	@J13,15
N041021005	JACK MIDI 5PIN(PCB)	2	J10,11
N041025206	HEADER .1"SP 6PIN DUAL3P	1	J12
N041025302	HEADER .156SP 2P (09-65-2028)	4	J3~6

Part No	Description	Q'ty	Location
N041025307	HEADER .156"SP 4P YW396-04V	1	J2
N041030002	HEADER .1"SP SGL ROW 2P	1	J13
N041030003	HEADER .1"SP 3PIN	1	J15
N041030150	HEADER DUAL 0.1"SQR 50POS	1	U9
N041031110	JACK 1/4" STEREO	1	J39,40
N041031220	HEADER .1"SP DUAL ROW 20P	3	J7~9
N041034004	HEADER .098"SP 4P (22-03-5045)	1	J29
N041034005	HEADER .098"SP 5P (22-03-5055)	1	J1
N052001223	CAP CERMONO	1	C167
N052001721	CAP ELEC	2	C7,169
N052002411	CAP ELECT	2	c12,182
N052002424	CAP ELECT	2	C131,153
N052003514	CAP ELECT	2	C28,43
N052003536	CAP POLY	2	C33,50
N052003727	CAP POLY	1	C164,165
N052004201	CAP ELECT EP/EG20/YDP2000N	4	C9,55,158,179
N052004204	CAP ELECT YDP2000N	1	C39
N052004214	CAP ELEC	1	C163
N052004315	CAP ELEC	4	C36,52,150,151
N052005102	CAP ELECT	3	C1,20,21
N052901602	CAP ELC GP 0.197"SP RAD	1	C142

Part No	Description	Q'ty	Location
N053000722	DIODE SHTKY 3A 60V	1	D10
N055001127	IND CHOKE 22uh 2.0A 10% RAD	4	L3~6
N055001128	IND TOROIDAL 260UH 65TURN-0.5MM	1	L25
N055004301	EMI FILTER,DUAL	2	T1,2
N061008001	IC SW REGULATOR STEP DOWN REG	1	U40
N035040105	BATTERY COINCELL 3V, 195mah	1	

4.1.5 ASSY CABLE

Part No	Description	Q'ty	Location
N012106044	ASSY CABLE ENGINE TO FRONT PANEL	1	0.1" SP, 20Pin, Plat
N013042307	CABLE KEYBOARD BASS	1	
N013042306	CABLE KEYBOARD TREBLE	1	
N012106047	ASSY CABLE POWER TO ENGINE	1	0.196"SP 3PIN
N012106048	ASSY CABLE PEDAL(BODY) 1000MM	1	
N013050301	CABLE PEDAL(BODY) 1000mm	1	
N013024808	CABLE SPEAKER WOOFER L/R 600m	1	
N013024810	CABLE SPEAKER WOOFER LEFT 1150mm	1	
N012106050	ASSY CABLE HEADPHON	1	
N013050601	CABLE POWER SWITCH 1000mm	1	
N012106049	ASSY CABLE AC POWER(USA) 120V	1	
N013050701	CABLE FRONT PANEL LINK 30mm	1	

Part No	Description	Q'ty	Location
N013050801	CABLE SPEAKER TWEETER LEFT 1200mm	1	
N013050802	CABLE SPEAKER TWEETER RIGHT 650mm	1	

4.1.6 Speaker

Part No	Description	Q'ty	Location
N032024823	WOOFER SPEAKER 5 1/8" 30W8Ω	2	
N032020522	TWEETER SPEAKER	2	

Chapter 5

Schematics

5.1 Block Diagram

5.2 Audio

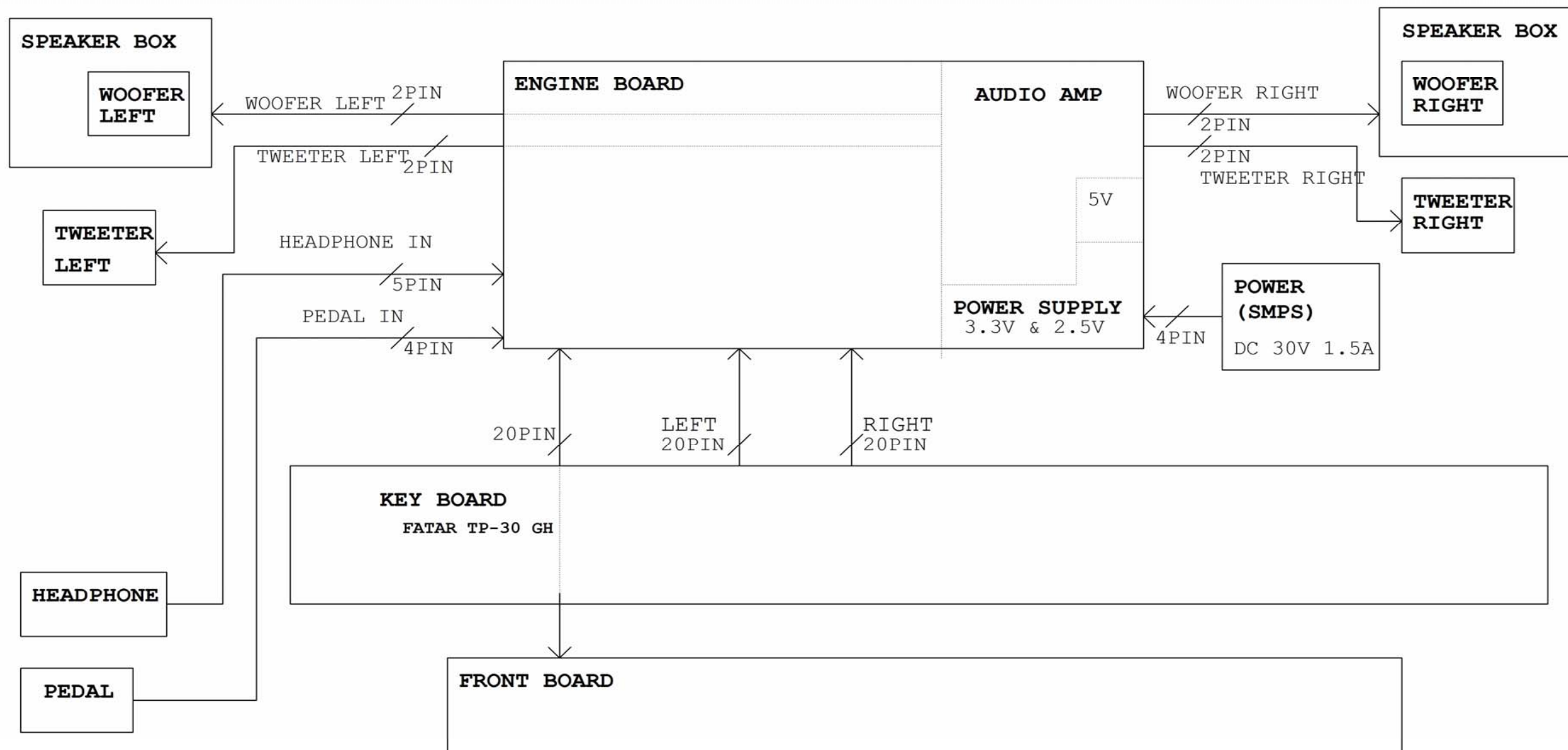
5.3 POWER

5.4 Sound CPU

5.5 Sound Engine

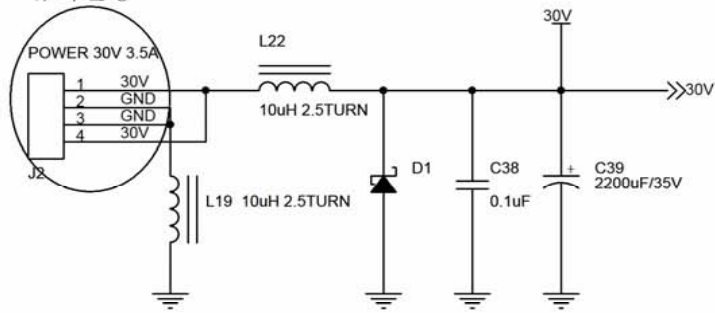
5.6 Front Panel

KME-D1 BLOCK DIAGRAM



Title		
KME-D1 Block Diagram		
Size	Document Number	Rev
A3		B
Date:	Wednesday, August 11, 2004	Sheet 1 of 6

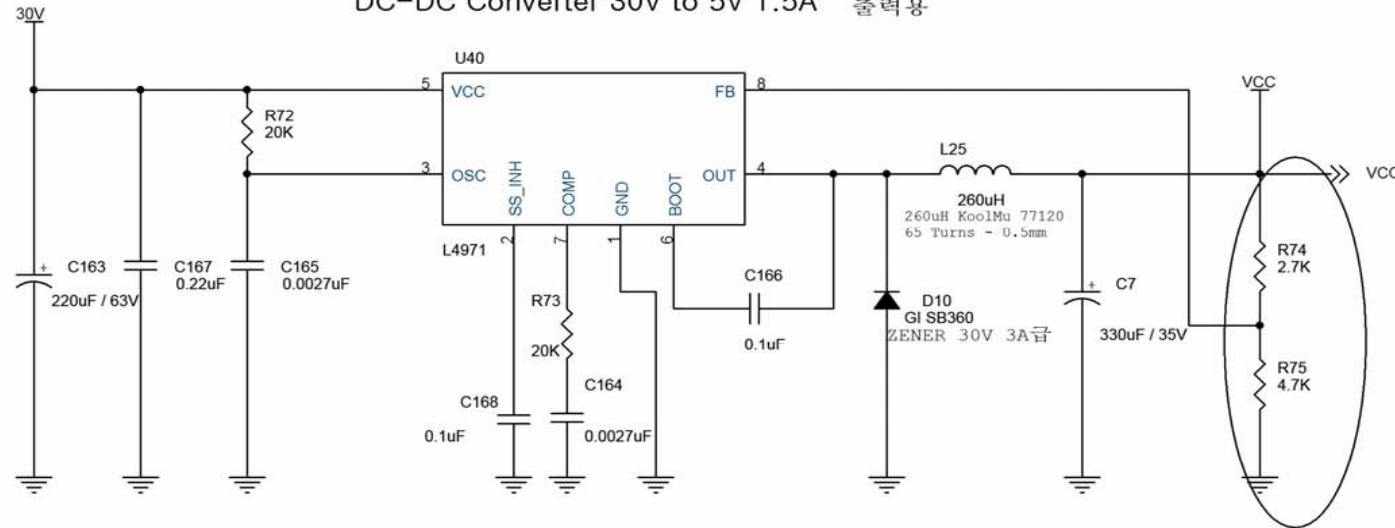
2004년 12월
SMPS 30V DC, 3.5A로
규격변경



2004년 6월 11일
L19, L22 추가

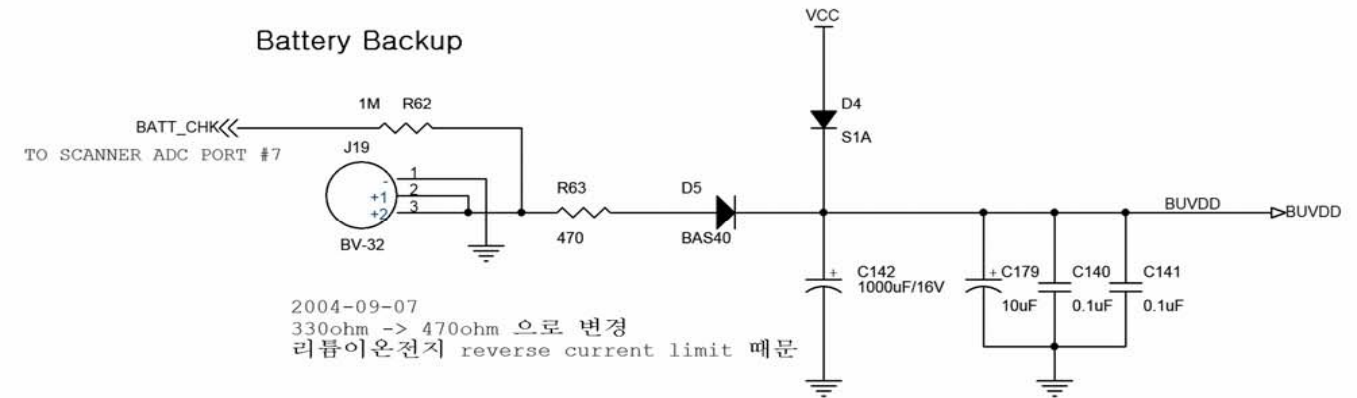
2004년 1월 15일
POWER관련부분 ARTWORK시 오디오 및 엔진부분과
GND분리할것

DC-DC Converter 30V to 5V 1.5A



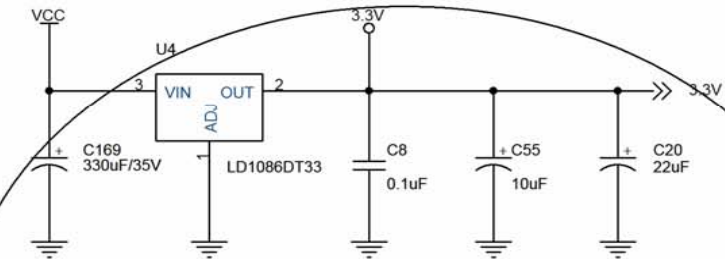
2004년 12월
직렬연결 저항값에 따라
출력전압결정
현재는 5V configuration

Battery Backup



2004-09-07
330ohm -> 470ohm 으로 변경
리튬이온전지 reverse current limit 때문

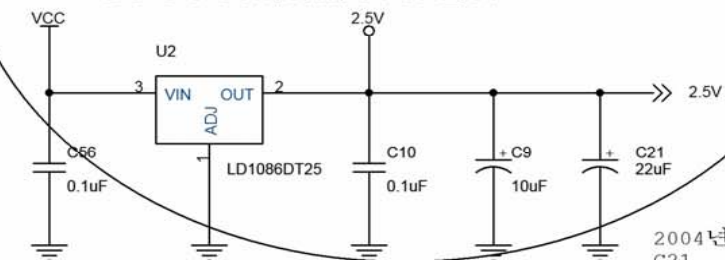
DC-DC Converter 5V to 3.3V



C169 :
33uF /10V -> 330uF /10V 로
수정

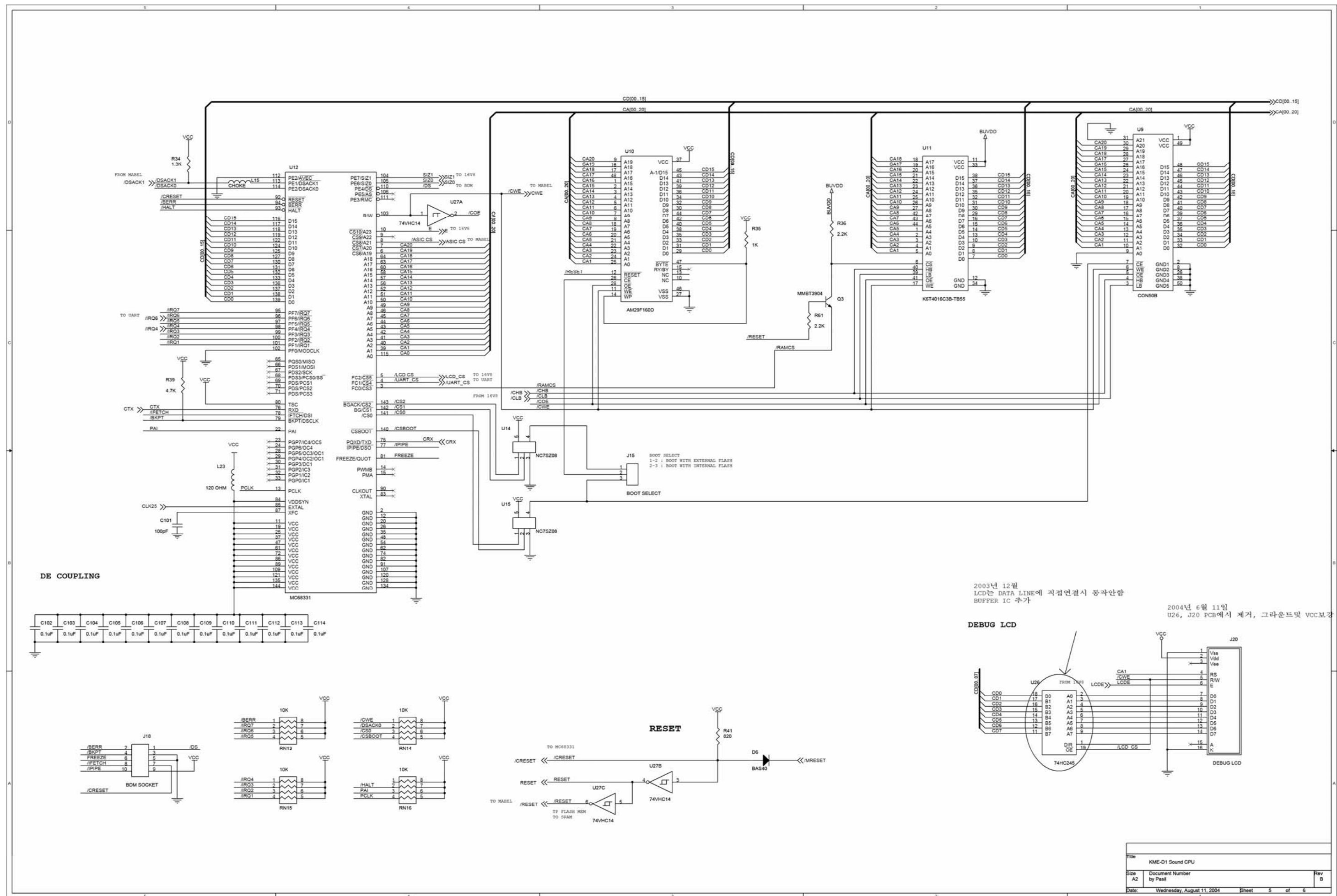
2004년 5월 14일
C20 - 22uF 추가

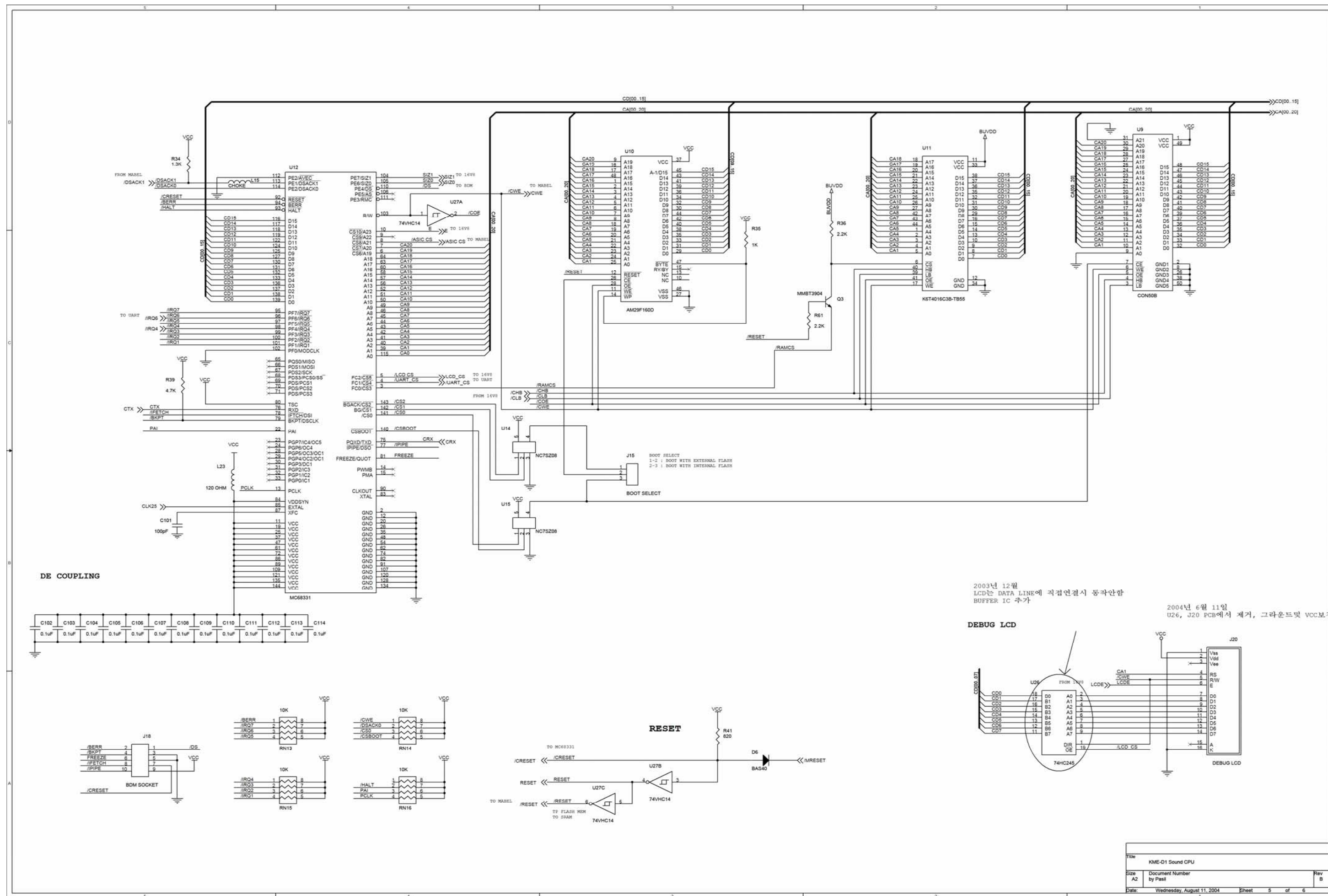
DC-DC Converter 5V to 2.5V

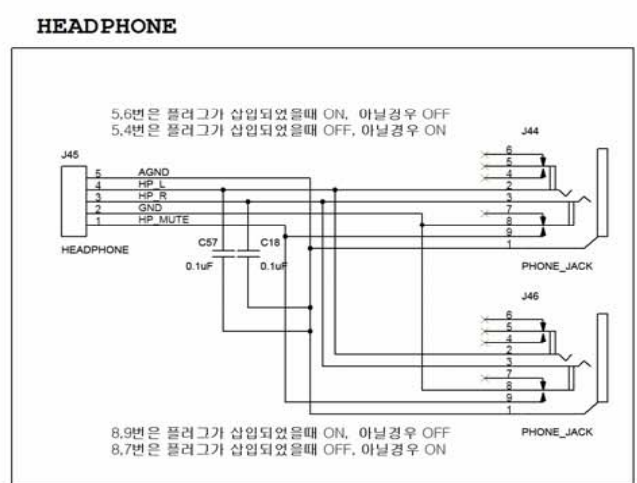
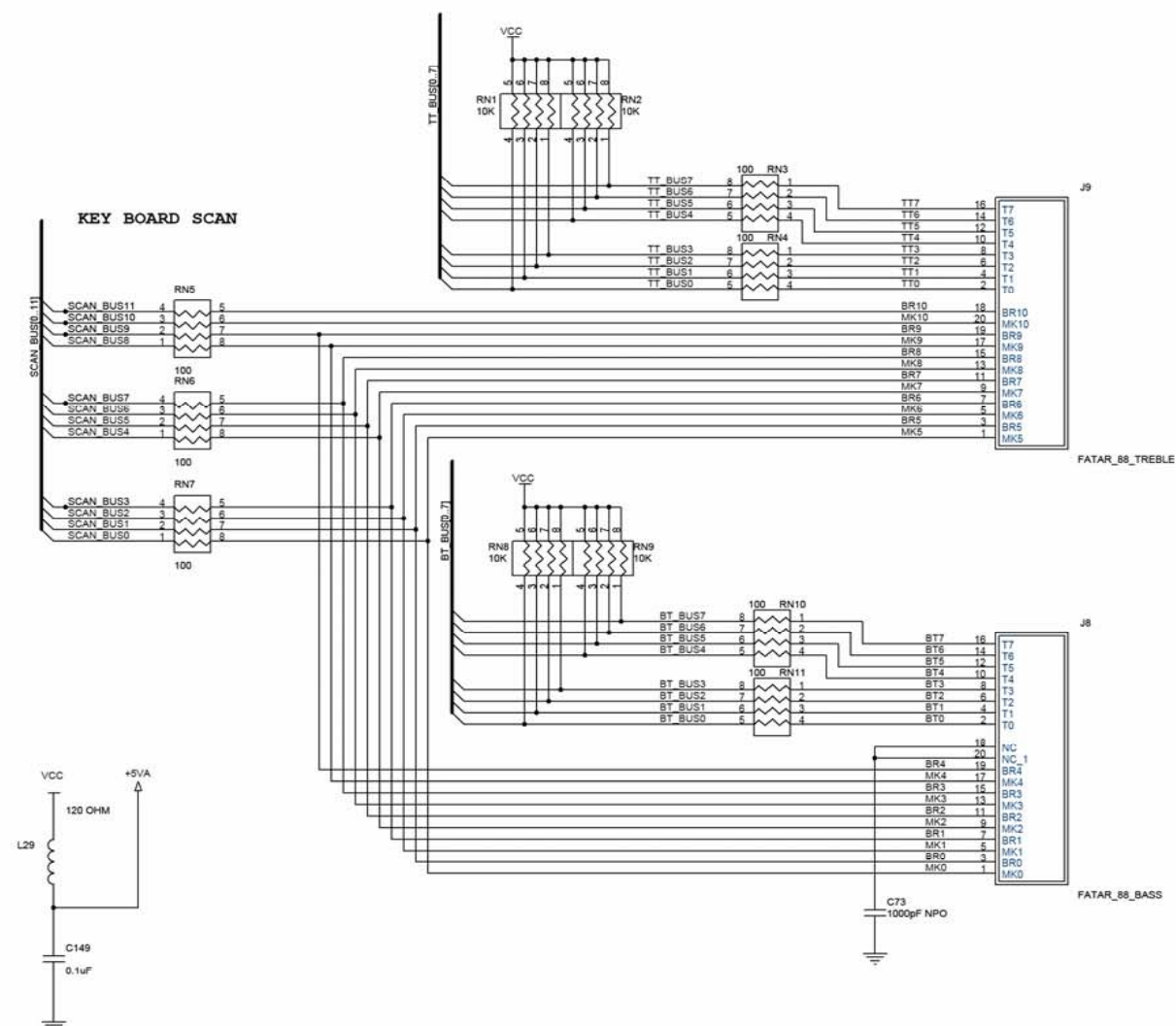


2004년 5월 14일
C21 - 22uF 추가

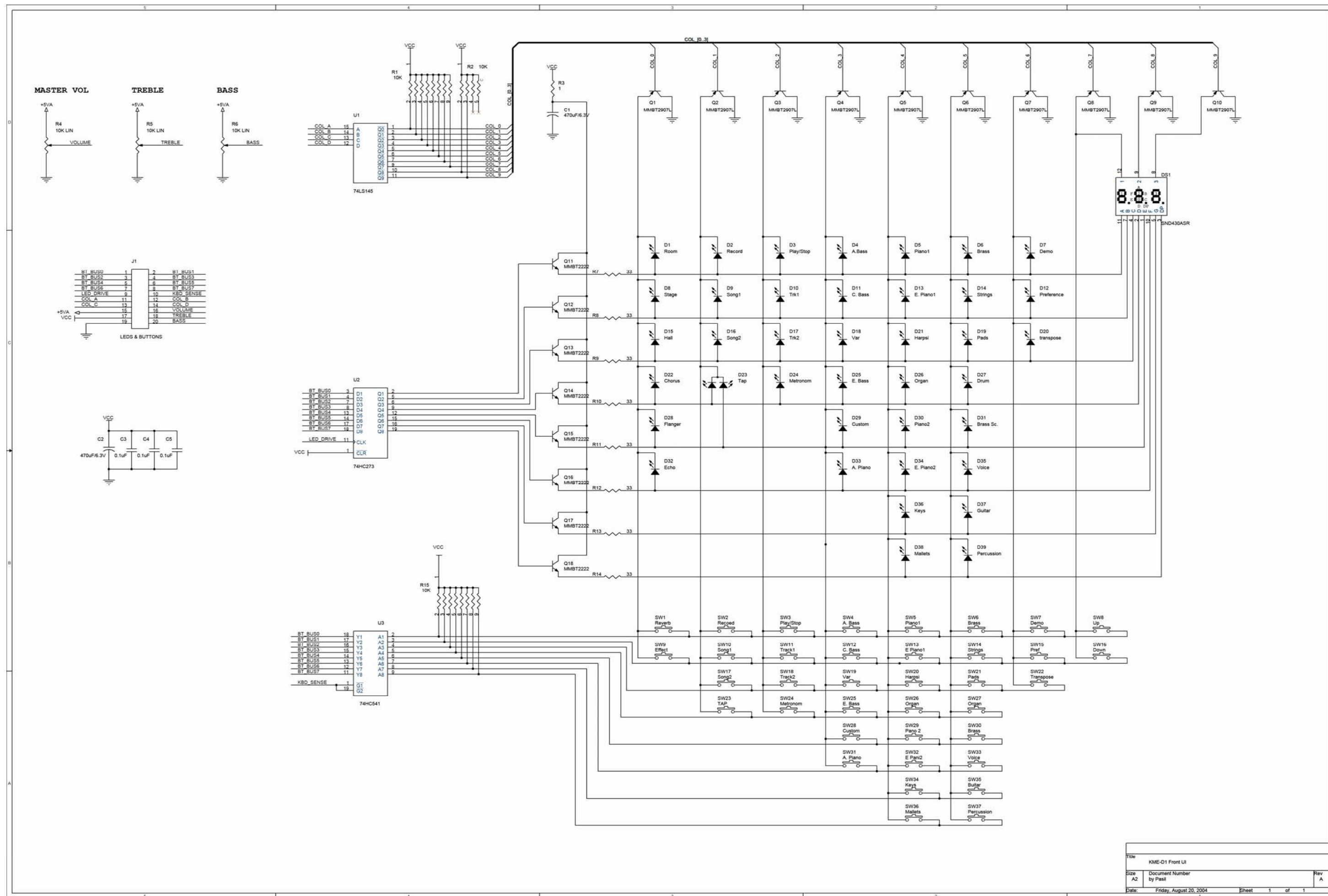
Title		
KME D1 Power Stage		
Size	Document Number	Rev
A3	by Pasil	B
Date:	Tuesday, September 07, 2004	Sheet 3 of 6







Title			
KME-D1 Scanner			
Size A2	Document Number by Pasil	Rev B	
Date:	Wednesday, August 11, 2004	Sheet	4 of 6



Title	KME-D1 Front UI
Size	A2
Document Number	by Passi
Date:	Friday, August 20, 2004
Sheet	1 of 1
Rev	A